Art. X.—*Victorian Graptolites, Part IV.; Some New or Little-Known Species.*

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(With Plates XVII. and XVIII).

[Read July 9th, 1914].

The present paper contains the descriptions of some new species, as well as of some that it seems advisable of re-figure. Most of the specimens are from my own collection, others were collected by the officers of the Department of Mines at localities on which I have reported. Two fine specimens are the property of the National Museum, Melbourne, and others were found by Mr. T. S. Hart, at Daylesford.

Didymograptus extensus J. Hall. (Pl XVII. Fig. 1).

For synonymy see S. L. Tornquist, Lunds Univ., Arsskrift, Bd. 37 (1901), Afd. 2, No. 5, p. 14; Elles and Wood, Mon. Brit. Grap. Pt. 1 (1902), p. 8; Ruedemann. Grap. N. York, Pt. 1 (1904), p. 668.

The following description is drawn up from examples from Burn's Reef, Chewton :—

Branches diverging at 180°, so that even from the beginning they are in the same straight line. Width over first theca 0.5 mm.; at 3 cm. 1.5 mm., the increase in width being gradual and continuous. Thecae 10 in 1 cm., inclined at 35° to 40°. Apertural angle 100° to 110°. The gradual increase in the width of the branches, and their lying in one straight line, are very characteristic of this species.

Horizon.—Castlemainian.

Didymograptus perditus, n. sp. (Pl. XVII., Fig. 2).

Branches diverging directly at 180°, somewhat lax, and perhaps somewhat reclined. Width at first theca 1 mm., at 4 cm. 1.3 mm. Thecae 7 or 8 in 1 cm., inclined at about 30°, broadly expanding, so that the denticles are boldly salient. Apertural margin

at 115°. Sicula narrow, curved, 2 mm. long. The branches are given off near its apex, so that its pointed base projects beyond the line of the thecal denticles, giving the hydrosome a very characteristic appearance in this region. The small number of thecae and the salient denticles are also peculiar.

Locality.—Daphne Reef, Lost Gully, Chewton.

Horizon.—Highest zone of Bendigonian.

DIDYMOGRAPTUS GRACILIS Tornquist. (Pl. XVII., Fig. 3).

Tornquist. Acta Univ. Lund. vol. 26, 1890, pt. 2, No. 4, p. 17, pl. 1, figs. 9-12.

Hall, Geol. Mag. 1899, p. 448.

Hydrosome slender, about 1.3 mm. long, and very narrow, with a very delicate virgula, which is traceable for about 0.7 mm. Branches extending at 180°, and apparently arising at very different levels from the sicula, the left side of which projects as an acute tooth. The left branch is given off from about its middle, the right branch appears to arise at the level of the aperture. Dorsal edge of the branch covexly swollen opposite the middle of each theca. Thecae 7 in 1 cm.; slender, outer edge straight and facing somewhat inwards, the two edges forming an acute denticle. Breadth of branch about 0.3 mm.; width of theca at aperture about the same. The virgula, or nema, is visible in some specimens, but not in the specimen figured.

The figured specimen is from Bendigo.

Horizon.—Upper Bendigonian.

DIDYMOGRAPTUS AUREUS n. sp. (Pl. XVII., Fig. 4).

Hydrosome resembling *D. extensus* in form. Branches given off from the sicula at 180°, straight, and scarcely increasing in width. Width at first theca 1.2 mm., at 2 cm. it is 1.5. Thecae 8 in 1 cm. almost straight-sided, inclined at 30°, apertural angle 120°. Sicula 2.2 mm. long, slender, the branches arising near its base. The species differs from *D. extensus* in its more even with, and in the number of thecae in a given length.

Locality.—Bendigo (T.S.H.); Bald Hill, Dromana (D. J. Mahony).

Horizon.—Lower Bendigonian.

Didymograptus latens n. sp. (Pl. XVII., Fig. 5).

Hydrosome small. The branches curve towards one another dorsally, and become horizontal about the region of the fourth theca, the gentle curvature of the dorsal edge of the branch being very characteristic. Sicula broad and stout, about 1.5 mm. long, and slightly more across the aperture. Thecae 10 in 1 cm., very slightly expanding, inclined at 25°, overlapping half their length. Apertural edge normal to the thecal axis.

I have previously referred to this species as *D. aff. decens* Tqt.[1]; but the form of the sicula is different. It differs similarly from *D. suecicus*, Tullb.

Locality.—The type is from Diamond Hill, Bendigo, about 200 yards east of State school.

Horizon.—Upper and Middle Bendigonian. It is common, and apparently always small, at many localities.

Didymograptus procumbens n. sp. (Pl. XVII. Figs. 6 and 7).

Branches arising at right angles to the sicula, and then almost imperceptibly reflexed. Breadth at first theca 0.75 mm.; at 1 cm., 1.5 mm.; at 2 cm., 1.75 mm. Sicula 2 mm. long, 0.5 mm. broad, its aperture almost hidden by the first thecae. Thecae narrow, straight-sided, 8 in 1 cm., inclined at about 20° near the sicula, increasing to a little over 30° at 1.5 cm. Apertural margin from 100° to 120°.

In the Bendigo and Lower Castlemaine series the size of the hydrosome never seems to be more than 1 cm. in length, whereas in the slates of Victoria Gully, Castlemaine, just after the disappearance of *Phyllograptus typus*, a form occurs, which I regard as this species, which reaches a length of 4 cm.

Locality of type.—Diamond Hill, Bendigo.

Horizon.—Bendigonian to Middle Castlemainian.

Didymograptus adamantinus n. sp. (Pl. XVII., Fig. 8).

Branches about 1.5 cm. long, and rather slender; width about 0.7 mm. near the proximal end, increasing to 1 mm. at about 1 cm. from origin. Branches diverging at 150° to 160°, and almost straight. Thecae 10 or 11 in 1 cm., slightly expanding, overlap-

1. Geol. Mag., 1899.

ping about half their length; inclined at 30°, apertural margin at 100°. Sicula 1.3 mm. long, slender; the first theca arising near its apex.

The species is closely allied to *D. nicholsoni*, Lap., but differs a good deal in the proportions of the proximal part.

Locality.—The type is from Diamond Hill, Bendigo.

Horizon.—Bendigonian.

Didymograptus mundus n. sp. (Pl. XVII., Fig. 9).

Branches diverging at 130° to 150° from the sicula, and at about the tenth theca, running nearly horizontally, and from two to six cm. in length. Sicula rather narrow, about 1.5 mm. long. Thecae 9 in 1 cm. near the sicula, and about 8 in 1 cm. distally, broadly expanding, overlapping about one-half their length. Apertural margin normal to the thecal axis, inclined at 130°. Outer extremity forming an acute denticle. Width of branch over first theca 1 mm., and at 5 cm. from origin 1.7 mm. Details in sicular region not discernible in any of my specimens.

The species is closely allied to *D. nitidus*, and has generally been referred to it. McCoy, Etheridge and myself have recorded *D. nitidus* from various localities, but I now venture to think incorrectly. I have changed my mind several times about it, but have decided that a new name is advisable. *D. mundus* differs from *D. nitidus* in its slightly larger sicula, in the smaller number of thecae, and in their lower inclination. From *D. euodus* Lap it differs in its greater width proximally, and smaller width distally, though it agrees with it in several other characters.

Locality.—It is widely distributed, and characteristic of the Upper Bendigonian, and Lower and Middle zones of the Castlemainian.

Didymograptus dilatans n. sp. (Pl. XVII., Fig. 10).

Branches 3 or 4 cm. long, rigid, straight, diverging at about 150°, gradually widening. Width over first theca 0.5 mm., and at 25 mm. 1.0 mm. Sicula narrow, length about 1.3 mm. Thecae 8 or 9 in 10 mm., inclined at about 20°, slightly expanding, overlapping one-third to half their length. Aperture normal to axis of branch.

This species has the habit of *D. nicholsoni*, and *D. serratulus*, but differs in the marked increase in width of the branches, and

then different angle of divergence. I have previously recorded it as *D. cf. nicholsoni*. It is associated with *Tetragraptus pendens*, *Goniograptus thureani*, etc.

Locality.—Daylesford (T. S. Hart, Loc. No. 3, 1908, Type), Bendigo (Min. Dep., Nos. 4191, etc.).

Horizon.—Upper Bendigonian.

Didymograptus bifidus J. Hall. (Pl. XVII., Fig. 11).

Graptolithus bifidus J. Hall. Grap. Quebec Group, p. 73, pl. 1, fig. 16-18, pl. 3, fig. 9, 10.

Didymograptus bifidus Elles and Wood. Mon. Brit. Grap., 1901, p. 42, pl. 4, f. 1a-1f.

Didymograptus bifidus Ruedemann. Grap. N. York, pt. 1, p. 689.

Branches of hydrosome 10 to 30 mm. long, slightly increasing in width for the greater part of their length. Dorsal margin of branch straight, thecal margin curved. Branches diverging usually at from 20° to 30°, but the angle sometimes greater in a small variety. Thecae 11 or 12 in 1 cm., inclined at from 30° to 50°, four times as long as wide, free for nearly half their length. Apertural margin normal to the axis of the branch, concave, with a slightly mucronate denticle.

The description is drawn up from Victorian specimens. I have previously recorded *D. murchisoni* from Basin Creek, Coimadai, but am of opinion that the single specimen on which the record was founded is *D. bifidus*, and that I have not seen *D. murchisoni*.

Locality.—Wattle Gully, etc., Castlemaine, Basin Creek, Coimadai, Tarilta, Daylesford (T. S. Hart), Steiglitz, Bendigo.

Horizon.—Confined to the lowest zone of the Castlemainian and uppermost zone of the Bendigonian.

Didymograptus caduceus var. manubriatus var. nov. (Pl. XVII., Figs. 12, 13).

Differs from the typical form by the immense size of the sicula, which at the point of separation of the branches is as wide as the branch itself. Thecae 10 in 1 cm. Branches diverging at 130° to 140°, and varying from 2 to 3 mm. in width. There is considerable range in the width of the branches, and the angle of divergence, but the great size of the sicula is remarkable. The variety is common at the recorded localities.

Locality.—Quarry in hard blue slate, one mile west of school on road from Woodend to Macedon; in similar rock Steiglitz District (Min. Dept.).

Associates.—*Goniograptus* spp., *Oncograptus upsilon*, *D. caduceus* (large typical variety), *D. forcipiformis*, etc.

Horizon.—Castlemainian.

Oncograptus n. gen.

Hydrosome at first biserial, but later dividing into two uniserial branches. Thecae long, narrow and slightly curved.

The form of the genus is quite different from that of any other graptolite. The form of the thecae and the great width of the branches seem to remove it from the Dicranograptidae.

As regards its origin it may be pointed out that it resembles *D. caduceus* in the form of its thecae. Concrescence of the branches of this species for a certain distance would produce a somewhat similar form. The thecae of the uniserial part appear to be opposite, and not alternate, but though I have had a very large number of specimens before me, none show the details of structure very clearly, and I have waited in vain for a long time for better material.

Oncograptus upsilon, n. sp. (Pl. XVII., Fig. 14).

Uniserial portion about 12 mm. long. Breadth at level of bifurcation 10 or 12 mm. Width of uniserial branch about 6 mm. Length of branch 10 mm. These are the dimensions of the type, but the measurements vary a good deal in other specimens. The whole polypary has the form of an arrowhead.

Thecae 9 in 1 cm. Near the proximal end of the hydrosome they are at right angles to the axis, and probably at the proximal end itself have turned through an angle of 90°, and are in a line with the axis of the undivided portion. At the distal end of the uniserial branches they are inclined at about 30°. The apertures are trumpet shaped, and a long recurved denticle is present. The sicula has not been seen. The axil seems united by a membrane.

O. upsilon is the type of the genus.

Locality.—Frederick the Great Mine, Sebastian (Type). Quarries north and west of Gisborne; Steiglitz; Castlemaine (Harris); Yapeen (Ba. 90, Quartersheet 15 N.E.), in National Museum, probably collected by Ulrich in 1864; Ingliston (quarry near 42½ mile viaduct on railway. A. E. Kitson).

Horizon.—Castlemainian, but exact position uncertain.

Goniograptus macer T. S. Hall. (Pl. XVII., Fig. 15).

(Geol Mag., 1899, p. 449, figs. 9, 10).

"Hydrosome slender. Primary branches about 1 mm. in length, and forming an angle of 180° with each other. Secondary branches diverging at about 90° from each other, and then bending in a zig-zag manner at intervals of about 1.5 mm., and giving off tertiary branches from the salient angle. Tertiary branches from two to four in number. After giving off the final tertiary branches the secondary branches, as well as the tertiaries, may reach a length of 30 to 40 mm., and are fairly rigid. Sicula about 1 mm. in length, slender, and very slowly tapering. Thecae 8 or 9 in 10 mm., overlapping by half their length. Apertural margin slightly concave, forming an angle of about 110° with the axis of the branch. Outer margin inclined at about 25° to the axis of the branch, gently curving towards the distal extremity."

Horizon.—Rare in the Upper Bendigonian series, common in the lower zones of the Castlemainian.

There is a fine slab in the collection of the Mining Department (No. 9587), from Bendigo (71 Bo.), which shows about twenty examples of the species. I give a new figure of the type.

Goniograptus speciosus n. sp. (Pl. XVIII., and Text Fig. 1).

Hydrosome, when complete about 35 cm. in diameter, since the distance from the sicular position to the extremity of the final branch given off is 17.5 cm. United length of the primary branches ("funicle") is 3 mm. Length of longest branch measured (a final branch) is 14.5 cm. The number of tertiary branches in the

Thecae × 7.

Fig. 1.

type averages 6 on each side of the four secondary branches, or about 48 in all. Width of branch to tip of denticle 3 mm. Thecae 8 or 9 in 10 mm., inclined at 40° to 50°. Apertural margin at 130°. Thecae slightly curved, and expanded with a somewhat mucronate denticle, and overlapping about one-half their length. The inner end of the outer wall reaches as far back as the denticle of the next theca but one. The type specimen is in the National Museum, Melbourne, and is perhaps the most beautiful graptolite known, though in point of size it is surpassed by a few other species, especially of *Clonograptus*.

Locality.—Slate-quarry about 8 miles S.W. of Woodend. I have a less perfect specimen from the same locality. A fragment of the same species was collected at an unknown locality at Bendigo.

Horizon.—Castlemainian, but exact position uncertain. On the same slab as the type occur *Goniograptus thureani*, *Didymograptus caduceus*, *D. caduceus var. manubriatus*, *Phyllograptus cf. typus*, *Oncograptus upsilon*, and apparently a *Trigonograptus*, etc.

The type was found by Mr. Neil Johnson, and presented to the National Museum in 1889.

Goniograptus crinitus n. sp. (Text Figs. 2 and 3).

This species is doubtfully referred to *Goniograptus* as a complete hydrosome is unknown. The specimens found are usually in the form of stout branches, which are bent in a zig-zag, the angular bending being more pronounced towards the proximal end. At times two or three branches are associated, as in the figured specimen. The angles of the zig-zag are from two to four mm. apart, and from the salient angles are given off fine, theca-bearing branches, which are unbranched, and fairly rigid. These may be 100 mm. long or more. The main branches are about 0.75 mm. in diameter, and do not appear to be theca-bearing. The finest branches are about 0.5 mm. in diameter, measured across the aperture of the theca. The thecae are rarely preserved, and when not visible the branch is about 0.25 mm. wide, and about as rigid as a horsehair. The thecae number 11 in 10 mm., and are straight-sided, inclined at about 10°, aperture normal to their length. At first sight this species might be mistaken for a *Thamnograptus*, and I formerly recorded it as such. The ultimate branches are, however, theca-bearing, and are much shorter than those figured by James Hall. *Thamnograptus* does not occur in the Bendigonian or Castlemainian series.

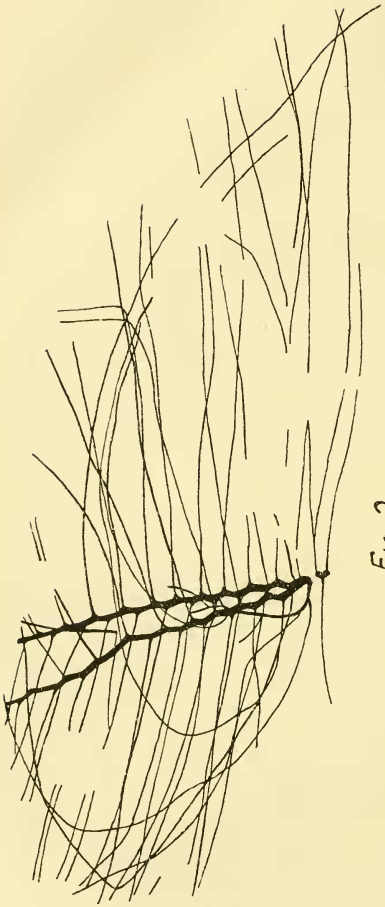

Fig. 2.

G. crinitus, × 1.

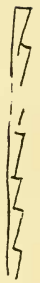

Fig. 3

G. crinitus, thecae × 7.

As stated above, I am not sure that the reference to *Goniograptus* is correct, but I hesitate to form a new genus for its reception, till a complete hydrosome is found. The form of the thecae is much more primitive than that of the typical species of *Goniograptus*.

Horizon.—Upper Bendigonian and Lower Castlemainian, but commoner in the former.

Goniograptus laxus n. sp. (Text Fig. 4).

Hydrosome slender. In the type two branches only are preserved, and these are in the one straight line, and reach a length of 35 mm. Ultimate branches arising at a distance of 2 mm. apart, and may be more than 25 mm. long. No thecae are visible.

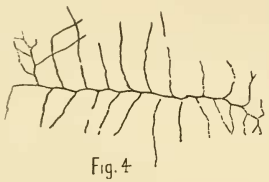

Fig. 4

G. laxus × 1.

The species differs from *G. thureani* in the more slender and lax habit of the ultimate branches. (Coll. Min. Dept., No. 8360.) The counterpart No. 8358 has been preserved.

Locality of type.—Bendigo (M.D. 38 Bo. Near Garden Gully Mine).

Horizon.—Bendigonian Upper zones.

Tetragraptus harti n. sp. (Text Figs. 5, 6).

Hydrosome slender and rigid, with the habit of *T. quadribrachiatus*. Sicula unknown. Primary branches in same straight line. Secondary branches given off after first theca of primary branch, diverging at about 90°, slender, fairly rigid. Width of secondary branch to tip of denticle at 2 mm. from origin, 0.5 mm.; at 35 mm. it is 1 mm. Thecae 8 in 1 cm., narrow, very slightly expanding, inclined at 15° to axis of branch. Aperture norma to axis of theca. Overlap slightly over one-third.

Fig 5

T. harti, type, × 1.

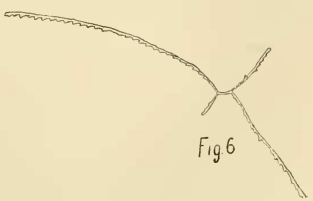

Fig 6

T. harti, cotype, × 1.

Locality.—Bendigo (M. Dep. 79 Bo., No. 9750, Type); Daylesford, Junction of Jim Crow and Spring Creeks, T. S. Hart; Daylesford, Min. Dep., No. 12,820.

Horizon.—Highest Bendigonian.

Tetragraptus whitelawi n. sp. (Pl. XVII., Fig. 16).

Hydrosome slender. Primary branches at 180°, dividing at the fifth theca. Length of branch, about 4.5 mm. Secondaries diverging at 90°, fairly rigid. Width of branches nearly 0.5 mm. Sicula long and narrow, length 1 mm., breadth 0.2 mm. Thecae 10 in 1 cm., indenting the branch about half its width, inclined at 15°, very slightly expanding. Aperture normal to the axis of the theca.

The great length of the "funicle," slightly over 1 cm., and the slender nature of the branches are well marked characters.

Locality.—Bendigo, Sheepshead Line (79 Bo.), Mining Department, No. 9756 Type. Counterpart, No. 9761. Associated with *T. serra*, (=*T. amii*), *Gonigraptus laxus*, *Didymograptus caduceus*.

Horizon.—Upper Bendigonian.

Monograptus aplini n. sp. (Pl. XVII., Fig. 17).

Very minute, curved towards the ventral side. The most complete specimens from an open U-shaped figure. Thecae 18-20 in 10 mm.; apparently coiled in a rounded mass and opening laterally. Sicula about 1 mm. long and narrow.

This is the commonest graptolite in the beds just below the Keilor bridge. The section was discovered by Aplin in 1854, and was the first known graptolite locality in Australia. Unfortunately, the fauna is in a very bad state of preservation, or sixty years would not have elapsed before any species were described from the locality.

M. aplini is closely allied to *M. exiguus*, Nicholson, and *M. nodifer*, Tornquist, but its minute size separates it from them.

Locality.—Keilor, Aplin's section.

Horizon.—Silurian, Melbournian.

Monograptus turriculatus Barrande. (Pl. XVII., Figs. 18, 19).

The conical spiral form, and the produced apertural angle of this species are unmistakable. The only two specimens I have seen are on the same slab, and are those figured. The specimens are

in the geological collection of the University of Melbourne, and are in a very imperfect state of preservation.

Horizon.—Silurian, Melbournian.

Monograptus priodon Bronn. (Pl. XVII., Fig. 20).

Hydrosome straight, rigid, nearly 2.5 mm. wide. Thecae 9 in 10 mm., sigmoidally curved and tapering to the aperture. The distal third bent back to form a strong hook like portion. Overlap about two-thirds.

The description is drawn up from a fragment, the only one I have seen. It is in relief, but merely as a cast. The matrix is a whitish, fine-grained micaceous sandstone.

Locality.—Macclesfield.

Horizon.—Probably Melbournian.

Triaenograptus neglectus n. g. et n. sp. (Text Fig. 7).

Hydrosome probably circular in outline, and slightly concave near the middle, as in some species of *Dictyonema*. Branches radiating from the centre. These branches give off a pair of lateral branches, one on each side of the main branch. The three branches thus formed produce a trident-like structure, which suggests the generic name. The laterals from one branch usually unite with corresponding laterals given off at the same level by a neighbouring branch, and then run on as a new single branch. This in its turn gives off lateral branches, which behave in the same way. Diameter of the type, 35 cm. Width of branches, 1.5 mm. Interspaces or fenestrae, two or three times as long as wide. Thecae, 5 or 6 in 10 mm., only outer and apertural margins visible. They appear to be straight-sided, and indent the branch for a fifth of its diameter, and appear to be inclined at about 20°, but are so imperfectly shown, that I do not attempt to figure them.

The symmetrical method of branching is peculiar, and unlike that of any other graptolite known to me. Though apparently allied to *Dictyonema*, it seems worthy of generic rank.

The present specimen was found stored away in the National Museum, and the only record of its finding is contained in a newspaper cutting pasted on it. This states that a fossil, presumably the present one, was found in the Paving Company's Quarry, Barker's Creek. This can only refer, I think, to a long-deserted quarry on the right bank of the creek, nearly opposite the late

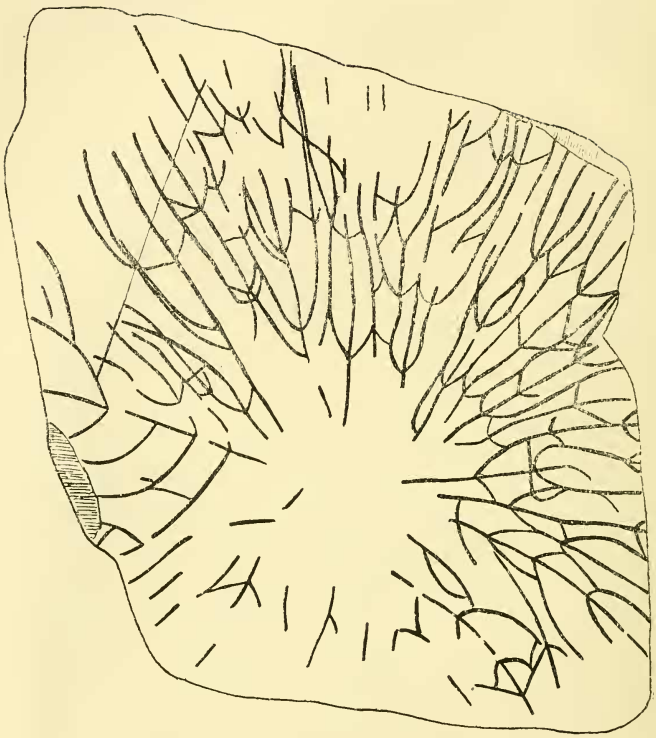

Fig. 7

T. neglectus × ½.

Major Ryland's house, and just below the Chinamen's Gardens. In my examination of this quarry many years ago, the only graptolites I found were *Tetragraptus serra*, *Dichograptus octobrachiatus* and *Didymograptus caduceus* (large variety). From the character of the last-named species, I should judge the horizon to be well up in the Castlemaine series, and the geographical posi-

tion of the quarry would support this view. The only other graptolite on the present slab besides *Triaemograptus* is a very indistinct example of apparently *Didymograptus extensus*.

Locality.—Barker's Creek Slate Quarry, North Castlemaine. Mr. W. J. Harris has found a couple of examples in badly cleaved slate from about the middle of the Castlemaine series, and to the south of the town. I have a few fragments, which long puzzled me from similar horizons in the same district, which I am now able to recognise as this species.

Horizon.—Middle and Upper Castlemaine series, but exact position not yet definitely known.

EXPLANATION OF PLATES.

Plate XVII.

Fig. 1.—*Didymograptus extensus* J. Hall. Burn's Reef, Castlemaine.

Fig. 2.—*Didymograptus perditus* n.sp. Daphne Reef, Lost Gully Chewton. (Type.)

Fig. 3.—*Didymograptus gracilis* Tornquist. Bendigo.

Fig. 4.—*Didymograptus aureus* n.sp. Bendigo. (Type.)

Fig. 5.—*Didymograptus latens* n.sp. Diamond Hill, Bendigo. (Type.)

Fig. 6.—*Didymograptus procumbens* n.sp. Diamond Hill, Bendigo. (Type.)

Fig. 7.—*Didymograptus procumbens* n.sp. Diamond Hill, Bendigo. (Co-type.)

Fig. 8.—*Didymograptus admanantinus* n.sp. Diamond Hill, Bendigo. (Type.)

Fig. 9.—*Didymograptus mundus* n.sp. Bendigo. (Type.)

Fig. 10.—*Didymograptus dilatans* n.sp. Daylesford (Sailors' Creek). T. S. Hart. (Type.)

Fig. 11.—*Didymograptus bifidus* J. Hall. Wattle Gully, Castlemaine.

Fig. 12.—*Didymograptus caduceus* var. *manubriatus* var. nov. West of Macedon. (Type.)

Fig. 13.—*Didymograptus caduceus* var. *manubriatus* var. nov. Macpherson's Creek, Steiglitz District. (Co-type.)

Fig. 14.—*Oncograptus upsilon* n. gen. et n.sp. Frederick the Great Mine, Sebastian. (Type.)

Fig. 15.—*Goniograptus macer* T. S. Hall. (Type refigured.)

Fig. 16.—*Tetragraptus whitelawi* n.sp. Bendigo, Sheepshead line. (Type.)

Fig. 17.—*Monograptus aplini* n.sp. Keilor (Aplin's section). (Type.) × 3.

Fig. 18.—*Monograptus turriculatus* Barrande. Keilor (Aplin's section).

Fig. 19.—*Monograptus turriculatus* Barrande. Keilor (Aplin's section).

Fig. 20.—*Monograptus priodon* Bronn. Macclesfield.

(*Note*.—All the figures on this plate are × $1\frac{1}{2}$, except fig. 17, which is × 3.)

Plate XVIII.

Gonigraptus speciosus n.sp. West of Macedon. (Type.) × $\frac{4}{9}$.

LIST OF INSET BLOCKS.

Fig. 1.—Goniograptus speciosus n.sp. Thecae × 7.

Fig. 2.—Goniograptus crinitus n.sp. × 1.

Fig. 3.—Goniograptus crinitus n.sp. Thecae × 7.

Fig. 4.—Goniograptus laxus n.sp. × 1.

Fig. 5.—Tetragraptus harti n.sp. × 1.

Fig. 6.—Tetragraptus harti n.sp. × 1.

Fig. 7.—Triaenograptus neglectus n.gen. et n.sp. × $\frac{1}{3}$. (Traced from a photograph.)